



University of Groningen

Care Dependency Scale - psychometric testing of the Polish version

Dijkstra, Ate; Muszalik, Marta; Kedziora-Kornatowska, Kornelia; Kornatowski, Tomasz

Published in:
Scandinavian Journal of Caring Sciences

DOI:
[10.1111/j.1471-6712.2010.00797.x](https://doi.org/10.1111/j.1471-6712.2010.00797.x)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2010

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Dijkstra, A., Muszalik, M., Kedziora-Kornatowska, K., & Kornatowski, T. (2010). Care Dependency Scale - psychometric testing of the Polish version. *Scandinavian Journal of Caring Sciences*, 24, 62-66.
<https://doi.org/10.1111/j.1471-6712.2010.00797.x>

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Care Dependency Scale – psychometric testing of the Polish version

Ate Dijkstra MEd, PhD, RN (Senior Researcher)^{1,2}, **Marta Muszalik** PhD, RN (Chair)³, **Kornelia Kędziora-Kornatowska** MD, PhD (Professor, Head of the Chair)³ and **Tomasz Kornatowski** PhD, MD (Chair)⁴

¹Graduate School for Health Research SHARE, University of Groningen, Groningen, ²NHL University for Applied Sciences, Leeuwarden, The Netherlands, ³Clinic of Geriatrics and ⁴Department of Pharmacology and Therapy, Nicolaus Copernicus University, Collegium Medicum, Bydgoszcz, Poland

Scand J Caring Sci; 2010; 24: 62–66

Care Dependency Scale – psychometric testing of the Polish version

The importance of this study lies in the availability of psychometrically sound assessment instruments, which are of critical importance for the study of patient's care dependency and the provision of care to these patients. The aim of this study was to identify the psychometric properties of the Care Dependency Scale (CDS) by analyzing data gathered in Poland. The Polish research instrument was a translation of the original Dutch CDS. Psychometric evaluations were carried out based on a convenience sample of 216 older patients. A high alpha

coefficient of 0.98 was obtained. Subsequent inter-rater and test-retest reliability revealed Kappa values between 0.82–0.97 and 0.64–0.86, respectively. Factor analysis (principal component analysis) confirmed the one-factor model reported in earlier studies. The analysis of the scale showed that the instrument is promising to be used in elderly care in Poland. The Polish version of the CDS permits comparison with results from earlier studies using this instrument.

Keywords: dependency, Care Dependency Scale, Polish version, instrument testing, reliability, validity.

Submitted 1 February 2010, Accepted 17 March 2010

Introduction

Background

This study describes the first step to introduce an existing Dutch measurement instrument, the Care Dependency Scale (CDS), in Polish long-term care. Although there is no internationally accepted definition of long-term care, it usually means care for elderly (...) lasting or expected to last at least 6 months and requiring a high daily intensity (1). As the number of older people rise in Europe, the importance of long-term care can be expected to grow. For example, the increase in the aging population of 60+ grows in Poland from 16% in 1999 to 33% of the total population in 2050, and in the Netherlands, the same population grows from 18% in 1999 to 34% in 2050 (1). In Poland, long-term care, including care services for elderly persons, is provided within health care system and social assistance

scheme. The said kind of care is designed for bedridden and chronically ill persons, who do not manage to take care of themselves properly and who require round the clock, professional and intensive care and nursing, as well as further treatment (2). In the Netherlands, people who are in need for long-term care are – because of the nature of their problems and disorders – often living in residential homes or nursing homes with 24-hour supervision and a protected living environment (3). Based on need assessment, these care institutions provide elderly people nursing care, assistance with personal care activities and room and board. Concerning the quality of long-term care, there is still a lot of progress to be made in nursing performance, such as the application of standards and proven measurements instruments.

Care Dependency Scale

In 1997, an international group of nurse researchers created the European Research group in Elderly Care (EURECA). One of the research themes on which EURECA members have co-operated is the international development of the CDS. The CDS was originally developed in the Netherlands in 1994 as an instrument for care planning (4). The CDS provides a framework for assessing the care

Correspondence to:

Dr. Ate Dijkstra, NHL University for Applied Sciences, Noorderbreedte, Postbus 888, 8901 BR Leeuwarden, The Netherlands.
E-mail: ate.dijkstra@znb.nl

dependency status of institutionalized patients. It measures 15 human needs: eating and drinking, continence, body posture, mobility, day/night pattern, getting dressed and undressed, body temperature, hygiene, avoidance of danger, communication, contact with others, sense of rules and values, daily activities, recreational activities and learning ability. The instrument consists of these 15 care dependency items, each one of which has an item description and five care dependency criteria. Nurses rate all items by selecting one criterion out of the five. Low scores on the items indicate that patients are completely dependent on care. On the other hand, high scores mean that patients are almost independent of care.

Development and psychometric testing of the Dutch CDS is described in several studies. In the first study, the concept of care dependency was operationalised (5), and 44 experts in a Delphi survey established content validity of the initial scale (6). Reliability of the scale was determined as inter-rater reliability (IRR) (Kappa) 0.40–0.64, test–retest reliability (TRR) (Kappa) 0.55–0.80 and Cronbach's Alpha 0.97 (7). Utility tests revealed that the CDS is easy to use and quick to complete, normally taking <5 minutes (7). A factor analysis was carried out and resulted in a unifactorial solution (Eigenvalue 10.721). In addition, Mokken scale analysis for the whole scale demonstrated a high H-coefficient 0.75 (8, 9). Indications for the criterion-related validity were found by comparing the CDS with three reasonably reliable and valid instruments (10). Besides these studies, the international psychometric properties of the CDS were determined using data sets from Canada, Italy, Norway and The Netherlands (11), Finland, Spain and the United Kingdom (12) and Germany (13).

Use in the caring process

The CDS is intended to be used in the first stage of the caring or nursing process as a needs assessment tool. The scale gives no direct answers, but indicates directions so that nurses and other health carers can focus on care needs amenable to nursing or caring diagnoses. The CDS is a scale derived from observed behavior, so the accuracy of the assessment depends on the degree to which the health carer is familiar with the daily functioning, care demands and needs of the patient. Therefore, practising nurses or health carers are in the best position to assess patients, especially in situations where the latter are unable to communicate or have limited communication capabilities.

Aim

The development of a measurement instrument takes a lot of time, material and human resources. Therefore, it is much easier to translate an already existing tool with proven psychometric properties. The aim of this study was to

identify the psychometric properties of the Care Dependency Scale (CDS) by analyzing data gathered in Poland.

Method

Translation procedures

The translated text of the original Dutch CDS version into the Polish version was examined to see whether the text was understood and seen as valid by clinicians versed in the home language, and included items common across cultures (14). The most common and highly recommended procedure for verifying the translation of an instrument is back translation (15–17). The Language Centre of the University of Groningen performed the initial forward translation and backward translation for the English version, which has been used for translation the CDS in other than the Dutch language. This English version formed the basis for the translation of the CDS to Polish. Firstly, three independent translations have been performed by qualified Polish native translators and good in English. Translation of each item was discussed by three persons directly engaged in adaptive process. Then, the back translation was made by a native English translator good in Polish. The Polish version was also presented to a group of nurses in the Poland to assess clarity and understanding. Some item descriptions and criteria were subsequently modified to obtain a greater degree of clarity. The modification lies in adding detailed description in these places, where exact translation could wrong understand.

Participants and settings

CDS data were obtained from a convenience sample of 216 institutionalized older patients in Poland. The final sample consisted of 168 women and 48 men, hospitalized in the long-term care and residents of social welfare in the year 2008. The study involved patients aged 60 and over. The mean age was 80.8. The research included chronically ill patients (diabetics, rheumatic disease, dementia, chronic kidney disease or stroke victims and circulatory and skeletal system disease).

Procedure

Rating of the CDS status was performed by nurses most involved in the daily care of the patients. All raters (N = 15) were trained in using the CDS. The training consisted of information on the research procedure, the principles of assessment and instruction in the practical use of the CDS.

Reliability

According to Polit et al. (18), reliability is the degree of consistency or dependability with which an instrument

measures the attribute it is designed to measure. In this study, internal consistency of the CDS was assessed using item analysis (mean and standard deviation) and Cronbach's alpha (19, 20). In addition, the absence of chance errors was investigated to determine the reliability of the instrument. In that sense, reliability is regarded as an aspect of validity. Repeated measurements involving the same raters and patients in identical circumstances were performed to determine the reliability of the measurement, i.e., the absence of systematic errors. The measurements were repeated in two different ways. First, IRR was determined. Two raters independently administered the CDS for the same patient and at the same time (T1). Second, the test-retest method was used. One of the raters completed the CDS for the same patient twice, with a 2-week time interval (T2). This method was based on two assumptions, namely that no learning effects had occurred in the observer and that the health of the patient had not changed dramatically in the period between first and second measurement (18). Cohen's Kappa was used to calculate IRR and TRR (21). The verbal descriptions for different ranges of Kappa statistics, as described by Landis and Koch (22), are slight (<0.20), fair (0.21–0.40), moderate (0.41–0.60), substantial (0.61–0.80) and almost perfect (>0.80).

Validity

The construct validity of the CDS was examined using factor analysis (principal component analysis). With regard to construct validity, the CDS was assessed to determine whether it actually measures care dependency and does not contain any systematic errors. Principal components analysis was used to examine underlying conceptual dimensions of the 15-item CDS. Principal components analysis presents values for factor loadings, Eigenvalues and percentages of variance. Factor loadings express the correlations between each of the CDS items and the identified underlying factor. In this study, factor loadings >0.40 considered being significant. Eigenvalues for a factor express the amount of variance in the CDS data explaining by that factor as an equivalent number of items.

All statistical analyses were performed with SPSS-11.0 for Windows (SPSS, Chicago, IL, USA).

Ethical considerations

The permission to do this research was given in 2008 by the Bio-Ethical Committee at the Nicolaus Copernicus University in Toruń and the Collegium Medicum in Bydgoszcz. Patients were verbally informed about the purpose of the study. They were told that participation was voluntary and that a questionnaire about their (in)dependency status should be completed by a nurse most involved in their daily care. Those who accepted to participate and returned the informed consent were included in the final sample.

Results

Sample characteristics

The mean age of the group (N = 216) whose data were used in this study was 80.8 (SD 8.7), and 77.8% were female. Table 1 shows the mean score and standard deviation for each of the 15 CDS items. Further, the CDS sumscore was calculated by adding the outcome on the 15 CDS item scores. The mean CDS sumscores were for males 50.5 (SD 22.4), females 48.8 (SD 21.2) and for the total sample 49.2 (SD 21.4).

Reliability

Reliability of the CDS was analyzed in terms of internal consistency using Cronbach's alpha, mean inter-item correlation, IRR and TRR. Cronbach's alpha, a widely used reliability index, was calculated at the scale level for the whole sample. The result 0.98 was in accordance with previously reported coefficients (11, 12). The mean inter-item correlation showed the value of 0.74.

The Polish data revealed IRR Kappas between 0.82 and 0.97 (see Table 2). Table 2 further demonstrates TRR Kappa statistics ranging from 0.64 and 0.86 over an interval of 2 weeks.

Construct validity

Factor analysis (principal component analysis) was carried out to find out the common dimensions in the 15 care dependency items. In Table 3, unrotated principal component loadings of the scale items, Eigenvalues and percentages of explained variance are presented. For the Polish sample, the first factor had Eigenvalue of 11.4 and

Table 1 Means, standard deviation per item of the Care Dependency Scale (CDS) (n = 216)

CDS items	M (SD)
Eating/drinking	3.30 (1.5)
Continence	3.15 (1.8)
Body posture	3.08 (1.6)
Mobility	2.65 (1.6)
Day/night pattern	3.84 (1.4)
Getting (un)dressed	3.00 (1.7)
Body temperature	3.48 (1.4)
Hygiene	2.76 (1.6)
Avoidance of danger	2.91 (1.5)
Communication	3.69 (1.5)
Contact with others	3.14 (1.6)
Sense of rules/values	3.56 (1.6)
Daily activities	2.85 (1.5)
Recreational activities	2.33 (1.5)
Learning ability	2.70 (1.3)

Table 2 Inter-rater reliability (IRR) and test–retest reliability (TRR) (Kappa) of the Care Dependency Scale (CDS) (n = 216)

CDS items	IRR	TRR
Eating/drinking	0.82	0.76
Incontinence	0.95	0.86
Body posture	0.96	0.83
Mobility	0.96	0.80
Day/night pattern	0.92	0.76
Getting (un)dressed	0.91	0.85
Body temperature	0.96	0.71
Hygiene	0.94	0.79
Avoidance of danger	0.95	0.75
Communication	0.96	0.67
Contact with others	0.95	0.64
Sense of rules/values	0.97	0.77
Daily activities	0.94	0.75
Recreational activities	0.93	0.84
Learning ability	0.94	0.76

Table 3 Factor loadings, Eigenvalue and % variance of the Care Dependency Scale (CDS) (n = 216)

CDS items	F1	F2
Eating/drinking	0.83	–0.00
Incontinence	0.91	–0.12
Body posture	0.86	–0.26
Mobility	0.80	–0.46
Day/night pattern	0.78	0.30
Getting (un)dressed	0.93	–0.17
Body temperature	0.91	0.05
Hygiene	0.94	–0.16
Avoidance of danger	0.91	–0.02
Communication	0.84	0.34
Contact with others	0.86	0.33
Sense of rules/values	0.85	0.37
Daily activities	0.94	–0.12
Recreational activities	0.82	–0.23
Learning ability	0.86	0.19
Eigenvalue	11.4	0.91
% Variance	75.7	6.1

this factor explained 75.7% off the variance. Factor loadings ranged from 0.78 to 0.94. As none of the items had a factor loading lower than 0.40, no item reduction took place. Results of the second factor are also reported in Table 3.

Discussion

The importance of this study lies in determining the psychometric properties of the Polish version of the CDS. After all, the availability of a psychometrically sound assessment instrument is of critical importance for the study of

patient's care dependency and the provision of care to these patients.

In relation to reliability of the CDS, the result demonstrated a high level of internal consistency. Cronbach's alpha obtained was 0.98, indicating an excellent level of reliability both for group and individual comparison. This result was in accordance with those previously reported (4, 11, 12). According to Polit et al. (18), it indicates that the reliability of the scale is good enough for assessment purposes, both at group and individual level. The mean high inter-item correlation possibly points to a homogeneous population.

Regarding the IRR Kappas, the outcomes show almost perfect Kappa values. In all probability, these high Kappas were affected because raters received training and had worked in the long-term care and social welfare for a long time and so knew the patients very well. Stability of scores was assessed, using a test–retest strategy. TRR Kappa statistics for scores across the 2-week interval revealed substantial to almost perfect Kappa values for the total sample. The Kappa values in this study were in accordance with previous Dutch results (4).

Factor analysis procedure was used to identify the underlying concept of the CDS: care dependency. Factor analysis is essentially a method for identifying clusters of related variables (18). In extracting factors, principal component analysis was used to identify the number of factors to which the 15 care dependency items can sensibly be reduced. Factor analysis resulted in a one-factor solution. The high factor loadings prove that all items were affected by the same underlying care dependency concept. It can be concluded that the psychometric properties regarding construct validity were acceptable and showed strong similarities with earlier study outcomes (11–13).

The outcomes show that the Polish version of the CDS can be used as a reliable and valid aid to assess patient's needs and the degree of professional assistance required to meet these needs to develop a care plan. Further, repeated assessments with the CDS can provide Polish nurses data for monitoring change in patient status and, potentially, assessing the success of interventions in decreasing patient's dependency.

Furthermore, the CDS items have proven to be related to what Henderson (23) calls *fundamental* human needs that appear in every patient–nurse relationship, independent from cultural background.

Study results demonstrate that in research, the Polish version of the CDS can be used for international comparisons and can contribute to the development of international standards for need assessment of patients.

Conclusion

Taking the results together, the analyses in this study clearly demonstrate that factor analysis (principal compo-

nent analysis) confirmed the one-factor model reported in earlier studies. The analysis of the scale showed that the instrument is promising to be used in elderly care in Poland. The Polish version of the CDS permits comparison with results from earlier studies using this instrument. Ongoing research is recommended regarding the psychometric properties of the CDS in other patients groups and Polish health settings.

Author contribution

A. Dijkstra performed study design, analysis, manuscript drafting and supervision. M. Muszalik carried out data collection and manuscript revision – the data were carried from April to June 2008. K. Kędziora-Kornatowska and T. Kornatowski carried out manuscript revision.

Conflict of interest

No conflict of interest has been declared.

References

- 1 Ministry of Health, Welfare and Sports. *Health Care in an Ageing Society. A Challenge for all European Countries*. 2004, VWS, The Hague.
- 2 Ministry of Health, Welfare and Sports. Long-term care in the Netherlands. Comment Paper – Poland. Questionnaire: long term care: how to organize affordable, sustainable long-term care given the constraints of collective versus individual arrangements and responsibilities. The Netherlands, 10–11 February 2009.
- 3 Ministry of Health, Welfare and Sports. Long-term care in the Netherlands. The Exceptional Medical Expenses Act. Host country report. Peer review: long term care: how to organize affordable, sustainable long-term care given the constraints of collective versus individual arrangements and responsibilities. The Netherlands, 10–11 February 2009.
- 4 Dijkstra A. *Care Dependency; an Assessment Instrument for Use in Long-Term Care Facilities*. Academic thesis. 1998, De Regenboog, Groningen.
- 5 Dijkstra A, Buist G, Dassen ThWN. Operationalization of the concept of 'Nursing-Care Dependency' for use in long-term care facilities. *Aust N Z J Ment Health Nurs* 1998; 7: 142–51.
- 6 Dijkstra A, Buist G, Dassen ThWN. Nursing-care dependency: development of an assessment scale for demented and mentally handicapped patients. *Scand J Caring Sci* 1996; 10: 137–43.
- 7 Dijkstra A, Buist G, Dassen ThWN, Moorer P. A reliability and utility study of the Care Dependency Scale. *Scand J Caring Sci* 2000; 14: 155–61.
- 8 Dijkstra A, Buist G, Dassen ThWN. *Nursing-Care Dependency: Development and Psychometric Testing of the NCD-Scale for Demented and Mentally Handicapped In-patients*. In Research on Nursing throughout the Lifespan (Proceedings of the 8th Biennial Conference of the WENR), 1996, Ekblad & Co, Västermik; 1: 117–26.
- 9 Dijkstra A, Buist G, Moorer P, Dassen ThWN. Construct validity of the Nursing Care Dependency scale. *J Clin Nurs* 1999; 8: 380–8.
- 10 Dijkstra A, Buist G, Dassen ThWN. A criterion-related validity study of the Nursing-Care Dependency (NCD) scale. *Int J Nurs Stud* 1998; 35: 163–70.
- 11 Dijkstra A, Buist G, Brown L, Haven B, Romoren T, Zanotti R, Dassen ThWN, van den Heuvel W. An international psychometric testing of the Nursing-Care Dependency (NCD) scale. *J Adv Nurs* 2000; 4: 944–52.
- 12 Dijkstra A, Coleman M, Tomas C, Välimäki M, Dassen ThWN. Cross-cultural psychometric testing of the Care Dependency Scale with data gathered in three countries. *J Adv Nurs* 2003; 43(2): 181–7.
- 13 Lohrmann C, Dijkstra A, Dassen Th. Care dependency: testing the German version of the care dependency scale in nursing homes and on geriatric wards. *Scand J Caring Sci* 2003; 17(1): 51–56.
- 14 Chapman DW, Carter JF. Translation procedures for the cross-cultural use of measurements. *Educ Eval Policy Anal* 1979; 3: 71–76.
- 15 Jones E. Translation of quantitative measures for use in cross-cultural research. *Nurs Res* 1987; 36: 324–7.
- 16 Behling O, Law KS. *Translating Questionnaires and Other Research Instruments: Problems and Solutions*. 2000, Sage Publications, Inc, Thousands Oaks, CA, USA.
- 17 Cha ES, Kim KH, Erlen JA. Translation of scales in cross-cultural research: issues and techniques. *J Adv Nurs* 2007; 58(4): 386–95.
- 18 Polit DF, Beck CT, Hungler BP. *Nursing Research: Principles and Methods*, 7th edn. 2004, Lippincott, Williams & Wilkins, Philadelphia.
- 19 Cronbach LJ. Coefficient alpha and internal structure of tests. *Psychometrics* 1951; 3: 297–334.
- 20 Nunally JC, Bernstein IH. *Psychometric Theory*, 3rd edn. 1994, McGraw-Hill Inc., New York.
- 21 Cohen J. A coefficient of agreement for nominal scales. *Educ Psychol Meas* 1960; 20: 37–46.
- 22 Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics* 1977; 33: 159–74.
- 23 Henderson V. *The Nature of Nursing: A Definition and its Implications for Practice, Research and Education*. 1996, MacMillan Press, New York.